RESPONSIVENESS SUMMARY FOR COMMENTS RECEIVED BY EPA ON THE DRAFT BASELINE HUMAN HEALTH RISK ASSESSMENT FOR RECREATIONAL VISITORS FOR THE RICHARDSON FLAT TAILINGS SUPERFUND SITE, PARK CITY, SUMMIT COUNTY, UTAH

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The USEPA Region 8 released a draft report of the Baseline Human Health Risk Assessment for Recreational Visitors at the Richardson Flats Superfund Site for public review and comment in May 2002. United Park City Mines (UPCM) and the Utah Department of Environmental Quality (UDEQ) submitted formal comments to USEPA on the draft assessment. This document summarizes the comments received and presents USEPA's response to those comments.

1.0 RESPONSE TO COMMENTS RECEIVED FROM THE UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY (UDEQ), DATED JULY 16, 2002

Comment: Page ES-2. Exposure Assessment. Please indicate that in some instances children may be considered a "High Intensity User" but for this risk assessment the exposure scenario for the High Intensity User does not consider children.

Response: The document will be revised as requested.

Comment: Page 2-3. Section 2.2.3.1 Impoundment integrity Analyses. Please replace the word "seUSEPAge" with the word that was intended.

Response: The document will be changed accordingly with the correct word ("seepage").

Comment: Page 2-6. Section 2.4.3 Climate. The authors state "The average monthly temperature ranges from 19°F to 58°F with an average fro the year of 36°F." This cannot be accurate, please provide the correct annual climate estimates.

Response: This paragraph will be updated with the climate data reported by the Western Regional Climate Center (WRCC, 2002).

Comment: Page 4-1. Section 4.1.3 Exposed Populations and Potential Exposure Scenarios. Please place a sentence like the first two sentences in this section in the Executive Summary section.

Response: The document will be changed as recommended.

Comment: Page 5-10. Section 5.1.2.2.1 Inhalation of Particulates. There is no reference or

information provided for how the PEF value was calculated, other than the Arizona Department of Health Services derived it. Please provide UDEQ the information that was used to calculate this value so that it UDEQ can determine if it is acceptable.

Response: The document will be revised to define this parameter, how it is used, and give its basis.

2.0 RESPONSE TO COMMENTS RECEIVED FROM UNITED PARK CITY MINES, DATED OCTOBER 31, 2002

Comment: Overall, this assessment attempts to use realistic exposure scenarios yet remains conservative and health protective, and Exponent concurs with the conclusion that the site does not pose a significant health risk from exposure to metals under recreational use. However, despite our agreement with the conclusions of the assessment, we offer the following suggestions to further improve the accuracy of the assessment for evaluating the specific, foreseeable uses of this site. The most important issue that merits discussion pertains to exposure frequency. This is important because of the magnitude of the potential overestimate of assumed frequency, and because it affects all exposure pathways evaluated, including soil ingestion, water ingestion, dermal contact, and inhalation. Because of its importance, this issue is discussed first, followed by other issues, and then by comments regarding specific pages or sections of the document.

Response: No response needed.

Comment: Reliance on Land-Use Information from Other Areas

The justification for relying on land-use information for areas of Jefferson and Boulder County, Colorado, is not provided. As implemented, use of these data results in overestimates of exposure frequency under recreational use of the site. Specifically, the assessment uses values for all open-space visits within Jefferson County to quantify exposure frequency for this site. Given the diversity of terrain in the Park City area, and the lack of any specific attraction at the site, it is unreasonable to assume that all of an individual's "visits to open space" would occur at this site, particularly not over the extended exposure duration selected in the assessment. The assessment assumes that an individual would visit the site 50 (CTE) to 100 (RME) times per year, every year, over the course of a 24-year exposure duration. The most efficient mechanism for adjusting the assumed exposure frequency would be to incorporate into the exposure calculations an assumed "fraction contributed from THIS site," or "FS" value. The FS value could be determined based on professional judgment: assuming that over the course of the exposure duration no more than 1/20th of all open-space visits would occur at the site (i.e., incorporate an FS value of 0.05). Alternatively, the value could be

derived from land-use information: assuming that the number of open-space visits at this site would be proportional to the fraction of area this site represents, relative to all accessible open space in the Park City vicinity. Because of the specific nature and location of the site, this approach would result in a conservative estimate of exposure frequency: windy conditions during the winter, and the prevalence of insects at this site in the summer, make this an unattractive location for recreation, and use is likely lower than other areas within the Park City vicinity.

Response: EPA agrees that some recreational visitors may visit sites other than Richardson Flats, and will incorporate a parameter (FS) to adjust exposure frequency for visits to other sites. In the absence of any site-specific survey data, the CTE and RME values for this factor will be set to 0.5 and 1.0, respectively, based on professional judgement. The document will be revised to explain this factor and its derivation.

Additionally, the exposure frequency assumptions for the CTE and RME recreational visitor will be changed from 50 and 100 visits per year to 39 and 100 visits per year, respectively. These values were derived from the responses of 779 individuals interviewed during a 1996 survey of recreational visitors at mountain-type open space parks in Jefferson County, Colorado. In the absence of site-specific information on recreational use at the Richardson Flats site, this survey was used as a proxy for the potential recreational use of open space at the site. One survey question asked recreational users to quantify the number of times per year they visited Jefferson County Open Space Parks. The arithmetic mean (39 visits/year) and 90^{th} percentile (100 visits/year) of the total number of visits per year were calculated from the survey results and will be used as the CTE and RME exposure frequency assumptions, respectively. The document will be revised to include the justification for using recreational land-use information from studies in Jefferson and Boulder Counties in Colorado and to explain the derivation of the exposure frequency assumptions from these surveys.

Comment: Empirical Data for Air Concentrations of Metals Indicate Low Exposure

As described on page 3-6 of the assessment, the most recent empirical data collected from the site indicate that, other than zinc at low concentrations, metals are not detectable in air in the vicinity of the site. These data likely reflect the fact that the vast majority of the tailings have now been covered with clean fill, and the impoundment is no longer a source of air emissions. This information could have been used to dismiss inhalation of entrained dust as a potentially significant source of exposure to site-related metals. This information, and precedent risk assessments that have demonstrated the insignificance of this pathway relative to soil ingestion (e.g., Clark Fork River baseline risk assessment, U.S. EPA 1997), should have been used to determine that this source, though potentially complete, does not present a significant source of exposure. Excluding the inhalation

pathway is also consistent with EPA's soil screening guidance (U.S. EPA 1996), in which the level of exposure via particulate inhalation is not considered to approach that of soil ingestion for most chemicals, particularly the metals considered in this assessment.

Response: EPA agrees that the 1992 air monitoring data described in Section 3.7 support the conclusion that ambient concentrations of most metals are low. However, inhalation of particulates in air is a complete exposure pathway that can be evaluated quantitatively with the available data. Thus, regardless of expectations, it is appropriate to evaluate this pathway to demonstrate that the risks are low.

Additionally, emissions from wind erosion are not the only source of site metals in ambient air. Human disturbances of soil and tailings during recreational activities may release metals into ambient air, contributing to the total metal exposure from the site. The site conceptual model and document will be updated to clarify the two potential sources of metals in ambient air (emissions from wind erosion and emissions from human disturbances and activity).

Comment: Relative Bioavailability (RBA)

In EPA's assessment of Kennecott soils (U.S. EPA 1998), it is stated, "Evidence suggests that arsenic bioavailability in mining ores is less than the bioavailability of arsenic used in critical toxicity studies." Also, "Following discussion of studies describing arsenic bioavailability in mining waste," it was decided to use a relative bioavailability factor of 20% for arsenic in soil. Factors affecting the bioavailability of arsenic from materials at the Kennecott site likely also affect arsenic in soils from the Richardson Flat site. Even if addressed only qualitatively, the risk assessment should acknowledge that risk is probably less than indicated by the calculations, due to the reduced bioavailability of these metals from materials at the site.

Response: The uncertainty section will be revised to provide a more detailed discussion of the possibility that the RBA is lower than the default, and will provide a discussion of how the results would change if a lower value were assumed. However, in the absence of site-specific data, the default assumption of 0.8 will be used to quantify risks.

Comment: Page 3-1, Soils Data

The second paragraph states: "Currently, the cone-shaped tailings impoundment... " This statement is incorrect. At the present time, the tailings impoundment is not cone shaped, as can be seen in Figure 1-1 in the BHHRA. At one time, a cone of tailings was placed by Park City Ventures on the site. However, the cone was leveled in 1986, and this area of the impoundment was covered with more than 1.0 ft of clean soil.

Response: The document will be revised to clarify the current state of the tailings impoundment.

Comment: Page 3-2, Surface-Water Data

The second paragraph states: "Water data for the south diversion ditch are limited to samples collected after ditch reconstruction (1993 to present). The third paragraph states: "In August 1992, E&E collected surface water samples from Silver Creek and the south diversion ditch." Because the E&E data were collected in 1992, prior to the ditch reconstruction in 1993, none of the data for the south diversion ditch should be used in the risk assessment. On page 3-3, UPCM Monitoring, the document implies that data from 1982 to the present are used for the south diversion ditch. All data for the south diversion ditch prior to 1993 should be excluded from the risk assessment, and the data excluded should be clearly documented in each section.

Response: As stated in Section 3.3, EPA agrees that data for the south diversion ditch collected prior to 1993 should be excluded from the risk assessment. The document will be revised to clarify which data were used for the risk assessment. Additionally, all calculations will be revised to ensure that surface water data collected prior to 1993 from the diversion ditch are excluded.

Comment: Page 5-8, Surface-Water Ingestion Rate

Although the text acknowledges the diminished potential for water ingestion under the "wading" scenario selected for this site, the RME water ingestion rate of 30 mL/hour is close to the 50-mL/hour rate recommended for activities that include immersion in water, and is unlikely to result from non-immersion contact. We recommend that a value no greater than 5 mL/hour be incorporated into the assessment, and the difference in values for other parameters will adequately adjust for CTE and RME exposure levels. The assessment should also provide a justification for using information from another site (i.e., the FE Warren Site, in this instance) for application at this site.

Response: As discussed in Section 5.4.2, EPA recognizes the uncertainties in intake rates, and agrees that the 30 mL assumption is probably conservative and that the actual ingestion of surface water during recreational activities might be lower. However, in accordance with current methodology utilized in deriving Ambient Water Quality Criteria (AWQC) for protection of human health (USEPA, 1998), a 30 mL/hour intake rate for recreational activities was used as the RME intake rate. A discussion of the potential conservatism in this intake rate will be added to the uncertainty section of the document.

Comment: Pages 5-9 and 5-11 Tables

The number of years assumed in the averaging time does not agree with the exposure duration for the scenario being evaluated.

Response: The document will be revised as recommended.

Comment: Page 5-10 Equation

The defined parameters include a "TF" value, which does not appear in the calculation presented. Neither the equation nor the parameters define the PEF, and how it is used in the calculations.

Response: The document will be revised to include all terms, their derivation, and to justify the values used.

Comment: Page 5-11 Tables

The note at the bottom of the page indicates that there is a different PEF assumed for low intensity and high-intensity users. However, this is not reflected in the tables that present the assumed values. The text indicates that the PEF value is based on information from the Arizona Department of Health Services, but neither the derivation, citation, nor specific application is described in the document. All of this information needs to be provided in order to assess the applicability of these values to this site.

Response: The table will be revised as recommended. The document will be revised to define the PEF term, its derivation and reference, and the justification of its use at this site. Additionally, the default soil screening guidance PEF used to evaluate the low-intensity user will be adjusted to a regional-specific value in accord with the soil screening guidance.

Comment: Pages 5-17 and 5-18, Summing of Risks

Because of the means by which the exposure estimates are derived in this assessment, it is not appropriate to add risks across exposure pathways, particularly for the low-intensity user. By summing the values, the assessment makes the implicit assumption that an individual could simultaneously experience the high degree of sediment ingestion, soil/tailings ingestion, water ingestion, inhalation, and dermal absorption from water assumed in the assessment.

Response: EPA assumes this comment applies specifically to summation of RME risks across pathways. EPA agrees that it is unlikely that the same individual will have RME exposure to both soil/tailings and to surface water/sediment. However, summation of RME risks is a convenient screening approach, and if the sum of the RME risks is below a level of concern (as is the case here), then a more

detailed evaluation is not needed. A discussion will be added to the uncertainty section that addresses uncertainties associated with summing RME risks across exposure pathways.

Comment: Page 6-3, Soil Lead Concentrations

The soil lead concentrations used in both the Integrated Exposure Uptake and Biokinetic (IEUBK) child lead model and the adult lead model were 64 mg/kg and 1,331 mg/kg for residential and recreational (i.e., onsite) soils, respectively. The residential soil lead level used in the IEUBK model represents the 95% upper confidence limit (UCL) concentration of the background samples collected from around the site. The recreational soil lead level used in both the IEUBK and the adult lead models represents the 95% UCL concentration of all onsite samples. However, EPA guidance for both the IEUBK child lead model and the adult lead model indicates that the appropriate soil lead input to these models is the average concentration. Thus, the appropriate inputs for the Richardson Flats assessment would be the arithmetic mean of the soil lead concentrations in the background samples for residential exposures, and the arithmetic mean of the onsite samples for recreational exposures (or the geometric means if the soil lead distributions were determined to be lognormal).

Response: EPA agrees that for small areas, such as a residential yard, the recommended input for the child and adult lead models is the average soil lead concentration (USEPA, 1994). However, when aggregating lead data over a large exposure area with the potential for greater variations in lead concentrations, the average could underestimate the true mean soil lead concentration for the exposure unit. EPA believes that this is applicable to evaluating risks from lead at the Richardson Flats site where lead concentrations in onsite soil/tailing materials range from 14 to 5,875 mg/kg. EPA recognizes that using the 95^{th} UCL soil lead concentrations instead of the average concentration is a conservative estimate of exposures to lead at the site. The text in the uncertainty section will be expanded to address this further.

Comment: Page 6-3 through 6-6, IEUBK modeling

For the lead risk assessment for children, applying the Integrated Exposure Uptake and Biokinetic (IEUBK) model to a recreational scenario is a novel use of the model, but the implementation seemed generally appropriate.

The default assumption in the IEUBK model is that 45% of total soil ingestion comes from outdoor soil and 55% from indoor dust. The Richardson Flats assessment assumes that 100% of total ingested soil emanates from outdoor soil. It should be pointed out in the text that this is a very conservative approach; indoor dust lead levels would be significantly lower than onsite soil lead levels, and likely lower than residential soil lead levels. The result is an

overestimation of risk relative to the default assumption recommended by EPA.

Response: EPA agrees that assuming 100% of total ingested soil plus dust is from outdoor soil is a conservative approach to evaluating risks from lead at the site, and will revise the risk calculations so that exposure is based on the EPA default assumptions of 45% of the total is from outdoor soil and 55% is from indoor dust. Indoor dust concentrations will be calculated using the EPA default ($C_{dust} = 0.7 * C_{yard\ soil}$). Additionally, the weighted average concentration of lead in soil shown in the Table on page 6-4 will be recalculated based on a CTE intake rate for the recreational exposure scenario of 50 mg/day instead of the RME intake rate of 100 mg/day. This is consistent with the exposure assumptions for a recreational child shown in the table on page 5-3 and for using the IEUBK model to predict average blood lead concentrations for a population.

Comment: Page 6-8, Blood lead values

Updated baseline and geometric standard deviation blood lead values for adult females are now available from the new NHANES report (U.S. EPA 2002), and it might be appropriate to incorporate them into this assessment.

Response: The document will be revised in accordance with the revised guidance on adult blood levels from the Technical Review Workgroup for Lead (USEPA, 2002).

Comment: Figure 4-1, Conceptual Site Model

Some minor changes to this figure would make it more appropriate for application at this site. As discussed above, inhalation exposures at the site should be indicated as insignificant relative to other pathways. Also, separate columns depicting the potential significance for each exposed population (low intensity and high intensity) should be depicted in the figure. Finally, as presented, the CSM suggests that exposure from consumption of "site biota" is not evaluated because of the lack of data. For issues of risk communication or perception of possible risk, it is important to point out that the metals of concern at this site are not likely to be present in consumed tissues at concentrations that would be expected to result in adverse health effects.

Response: Figure 4-1 will be revised to include both low intensity and high intensity populations and to add another air pathway from emission of particulates from human disturbances. As previously discussed, although inhalation exposures to ambient air are likely insignificant, the pathway is complete and data are available to evaluate the pathway quantitatively. The figure will not be revised as recommended to remove this pathway. Additionally, "site biota" will be changed to "fish" in Figure 4-1, as this is the media of concern for humans, and text will be added to discuss that the COCs at the site (arsenic and lead) do not accumulate in fish tissues consumed by humans.

Comment: Appendix B

The text and tables in this appendix appear to use the terms RBC and PRG interchangeably. If they are intended to be interpreted differently, then the distinction should be made clear. Otherwise, consistent terminology should be incorporated. On page 8 of this appendix, the text discusses dermal absorption of metals. The text discusses the "concepts" that support the view that "this pathway is likely to be minor in comparison to the amount of exposure that occurs by soil and dust ingestion." In addition to presenting the "concepts," this text should cite EPA guidance that supports this position, such as the Risk Assessment Guidance for Superfund, Part E (U.S. EPA 2001).

Response: The text and tables in this appendix will be revised to use the term RBC. The document will be revised as recommended to reference USEPA (2001) as appropriate.

3.0 REFERENCES

Western Regional Climate Center (WRCC). 2002. Western United States Climate Historical Summaries. Climatological Data Summaries, Park City, Utah. http://www.wrcc.dri.edu/climsum.html Accessed November 2002.

USEPA. 1994. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. Publication Number 9285.7-15-1. EPA/540/R-93/081.

USEPA, 1998. Ambient Water Quality Criteria Derivation Methodology Human Health Technical Support Document. Final Draft. U.S. Environmental Protection Agency, Office of Science and Technology. EPA/822/B-98/005.

USEPA. 2001. Risk assessment guidance for Superfund, Volume I: Human health evaluation manual, Part E, Supplemental guidance for dermal risk assessment. Interim. EPA/540/R/99/005. OSWER Directive 9285.7-02EP. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC.

USEPA. 2002. Blood lead concentrations of U.S. adult females: Summary statistics from Phases 1 and 2 of the National Health and Nutrition Evaluation Survey (NHANES III). U.S. Environmental Protection Agency, Technical Review Workgroup for Lead.